

# MOSFET – N-Channel QFET

**1000 V, 8 A, 1.45  $\Omega$**

## FQA8N100C

### Description

These N-Channel Enhancement Mode power field effect transistors are produced using onsemi's proprietary, planar stripe, DMOS technology.

This Advanced Technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficient switched mode power supplies.

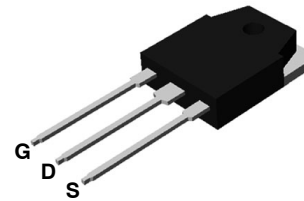
### Features

- $R_{DS(on)} = 1.45 \Omega$  (Max.) @  $V_{GS} = 10 V$ ,  $I_D = 4 A$
- Low Gate Charge (Typ. 53 nC)
- Low  $C_{rss}$  (Typ. 16 pF)
- 100% Avalanche Tested
- This Device is Pb-Free Halide, Free and RoHS Compliant

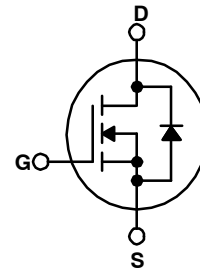
### MOSFET MAXIMUM RATINGS ( $T_C = 25^\circ C$ unless otherwise noted.)

| Symbol         | Parameter                                                                                    | Value           | Unit               |
|----------------|----------------------------------------------------------------------------------------------|-----------------|--------------------|
| $V_{DSS}$      | Drain to Source Voltage                                                                      | 1000            | V                  |
| $I_D$          | Drain Current<br>– Continuous ( $T_C = 25^\circ C$ )<br>– Continuous ( $T_C = 100^\circ C$ ) | 8<br>5          | A                  |
| $I_{DM}$       | Drain Current – Pulsed (Note 1)                                                              | 32              | A                  |
| $V_{GSS}$      | Gate to Source Voltage                                                                       | $\pm 30$        | V                  |
| $E_{AS}$       | Single Pulse Avalanche Energy (Note 2)                                                       | 850             | mJ                 |
| $I_{AR}$       | Avalanche Current (Note 1)                                                                   | 8               | A                  |
| $E_{AR}$       | Repetitive Avalanche Energy (Note 1)                                                         | 22.5            | mJ                 |
| $dv/dt$        | Peak Diode Recovery $dv/dt$ (Note 3)                                                         | 4.0             | V/ns               |
| $P_D$          | Power Dissipation<br>– ( $T_C = 25^\circ C$ )<br>– Derate Above $25^\circ C$                 | 225<br>1.79     | W<br>W/ $^\circ C$ |
| $T_J, T_{STG}$ | Operating and Storage Temperature Range                                                      | $-55$ to $+150$ | $^\circ C$         |
| $T_L$          | Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds                 | 300             | $^\circ C$         |

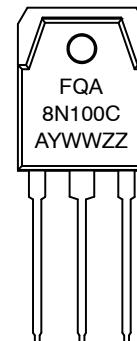
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



TO-3P-3LD  
CASE 340BZ



### MARKING DIAGRAM



FQA8N100C = Specific Device Code  
A = Assembly Location  
YWW = Date Code (Year & Week)  
ZZ = Assembly Lot

### ORDERING INFORMATION

| Device    | Package                | Shipping <sup>†</sup> |
|-----------|------------------------|-----------------------|
| FQA8N100C | TO-3P-3LD<br>(Pb-Free) | 450<br>Units / Tube   |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

# FQA8N100C

## THERMAL CHARACTERISTICS

| Symbol          | Parameter                                     | Value | Unit |
|-----------------|-----------------------------------------------|-------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max     | 0.56  | °C/W |
| $R_{\theta CS}$ | Thermal Resistance, Case-to-Sink, Typ.        | 0.24  |      |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient, Max. | 40    |      |

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--------|-----------|-----------------|-----|-----|-----|------|
|--------|-----------|-----------------|-----|-----|-----|------|

### Off Characteristics

|                                      |                                           |                                                     |      |     |      |               |
|--------------------------------------|-------------------------------------------|-----------------------------------------------------|------|-----|------|---------------|
| $BV_{DSS}$                           | Drain to Source Breakdown Voltage         | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 1000 | –   | –    | V             |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = 250\text{ }\mu\text{A}$ , Referenced to 25°C | –    | 1.4 | –    | V/°C          |
| $I_{DSS}$                            | Zero Gate Voltage Drain Current           | $V_{DS} = 1000\text{ V}, V_{GS} = 0\text{ V}$       | –    | –   | 10   | $\mu\text{A}$ |
|                                      | Zero Gate Voltage Drain Current           | $V_{DS} = 800\text{ V}, T_C = 125^\circ\text{C}$    | –    | –   | 100  | $\mu\text{A}$ |
| $I_{GSSF}$                           | Gate to Body Leakage Current, Forward     | $V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$         | –    | –   | 100  | nA            |
| $I_{GSSR}$                           | Gate to Body Leakage Current, Reverse     | $V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$        | –    | –   | –100 | nA            |

### On Characteristics

|              |                                   |                                                 |     |     |      |          |
|--------------|-----------------------------------|-------------------------------------------------|-----|-----|------|----------|
| $V_{GS(th)}$ | Gate Threshold Voltage            | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 3.0 | –   | 5.0  | V        |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS} = 10\text{ V}, I_D = 4\text{ A}$        | –   | 1.2 | 1.45 | $\Omega$ |
| $g_{FS}$     | Forward Transconductance          | $V_{DS} = 50\text{ V}, I_D = 4\text{ A}$        | –   | 8.0 | –    | S        |

### Dynamic Characteristics

|           |                              |                                                                 |   |      |      |    |
|-----------|------------------------------|-----------------------------------------------------------------|---|------|------|----|
| $C_{iss}$ | Input Capacitance            | $V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$ | – | 2475 | 3220 | pF |
| $C_{oss}$ | Output Capacitance           |                                                                 | – | 195  | 255  | pF |
| $C_{rss}$ | Reverse Transfer Capacitance |                                                                 | – | 16   | 24   | pF |

### Switching Characteristics

|              |                     |                                                                            |   |     |     |    |
|--------------|---------------------|----------------------------------------------------------------------------|---|-----|-----|----|
| $t_{d(on)}$  | Turn-On Delay Time  | $V_{DD} = 500\text{ V}, I_D = 8\text{ A}, R_G = 25\text{ }\Omega$ (Note 4) | – | 50  | 110 | ns |
| $t_r$        | Turn-On Rise Time   |                                                                            | – | 95  | 200 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time |                                                                            | – | 122 | 254 | ns |
| $t_f$        | Turn-Off Fall Time  |                                                                            | – | 80  | 170 | ns |
| $Q_g$        | Total Gate Charge   | $V_{DS} = 800\text{ V}, I_D = 8\text{ A}, V_{GS} = 10\text{ V}$ (Note 4)   | – | 53  | 70  | nC |
| $Q_{gs}$     | Gate-Source Charge  |                                                                            | – | 13  | –   | nC |
| $Q_{gd}$     | Gate-Drain Charge   |                                                                            | – | 23  | –   | nC |

### Drain-Source Diode Characteristics and Maximum Ratings

|                 |                                                          |                                                                                |   |     |     |    |
|-----------------|----------------------------------------------------------|--------------------------------------------------------------------------------|---|-----|-----|----|
| I <sub>S</sub>  | Maximum Continuous Drain to Source Diode Forward Current |                                                                                | – | –   | 8   | A  |
| I <sub>SM</sub> | Maximum Pulsed Drain to Source Diode Forward Current     |                                                                                | – | –   | 32  | A  |
| V <sub>SD</sub> | Drain to Source Diode Forward Voltage                    | V <sub>GS</sub> = 0 V, I <sub>S</sub> = 8 A                                    | – | –   | 1.4 | V  |
| t <sub>rr</sub> | Reverse Recovery Time                                    | V <sub>GS</sub> = 0 V, I <sub>S</sub> = 8 A,<br>dI <sub>F</sub> /dt = 100 A/μs | – | 620 | –   | ns |
| Q <sub>rr</sub> | Reverse Recovery Charge                                  |                                                                                | – | 5.2 | –   | μC |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

#### NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2.  $L = 25\text{ mH}$ ,  $I_{AS} = 8\text{ A}$ ,  $V_{DD} = 50\text{ V}$ ,  $R_G = 25\text{ }\Omega$  starting  $T_J = 25^\circ\text{C}$ .
3.  $I_{SD} \leq 8\text{ A}$ ,  $di/dt \leq 200\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , starting  $T_J = 25^\circ\text{C}$ .
4. Essentially independent of operating temperature typical characteristics.

## TYPICAL CHARACTERISTICS

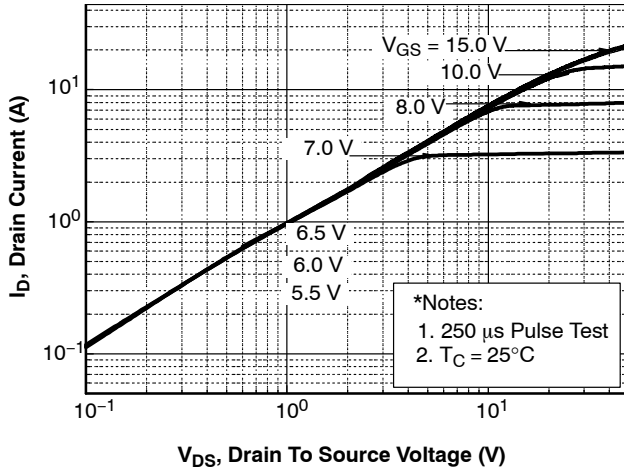


Figure 1. On-Region Characteristics

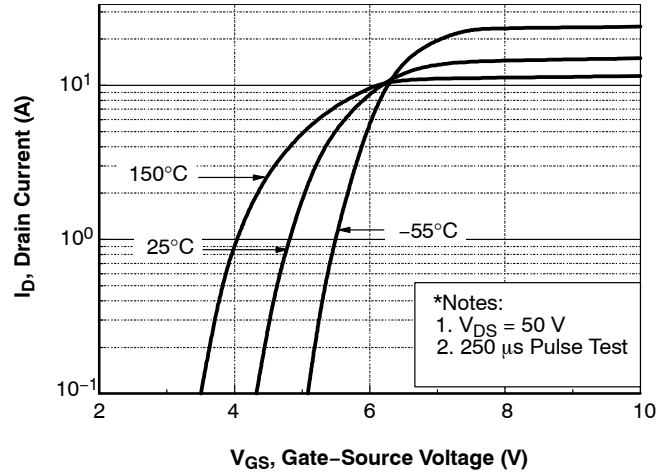


Figure 2. Transfer Characteristics

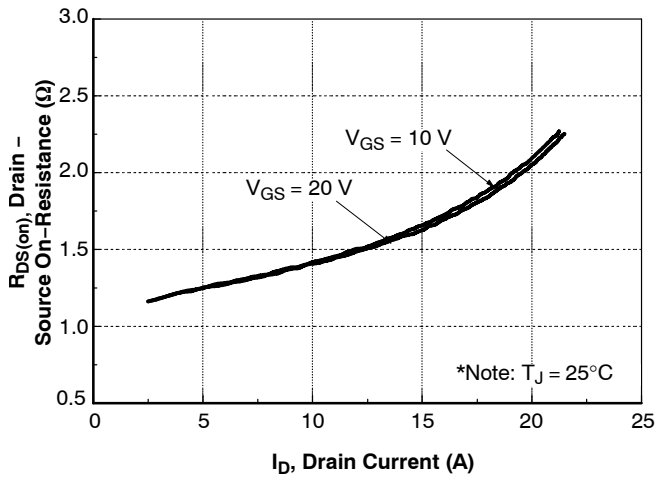


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

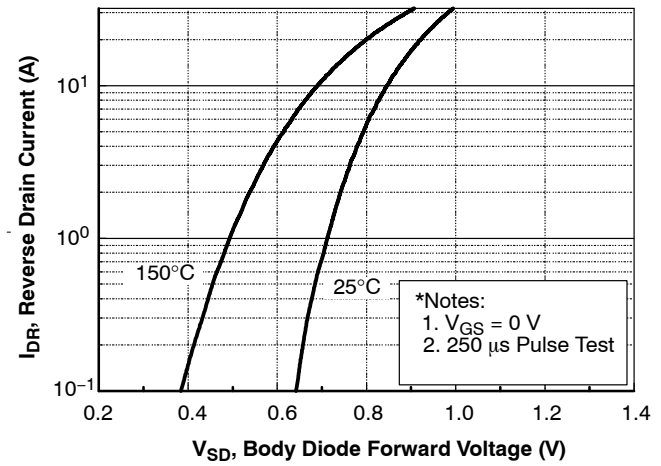


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

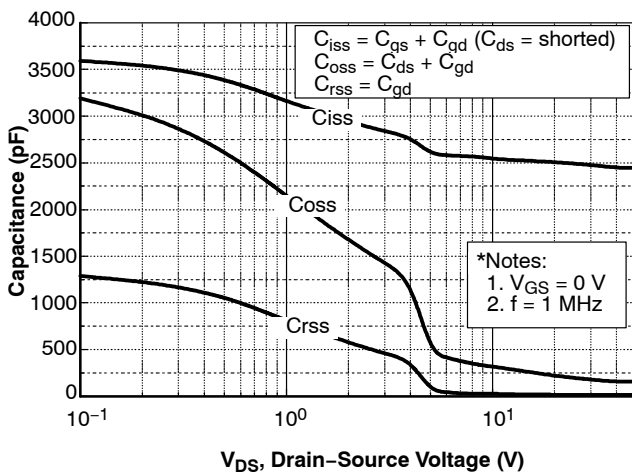


Figure 5. Capacitance Characteristics

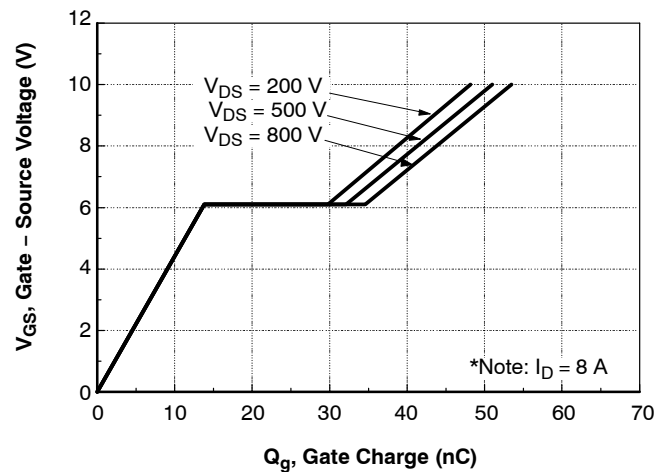


Figure 6. Gate Charge Characteristics

TYPICAL CHARACTERISTICS (CONTINUED)

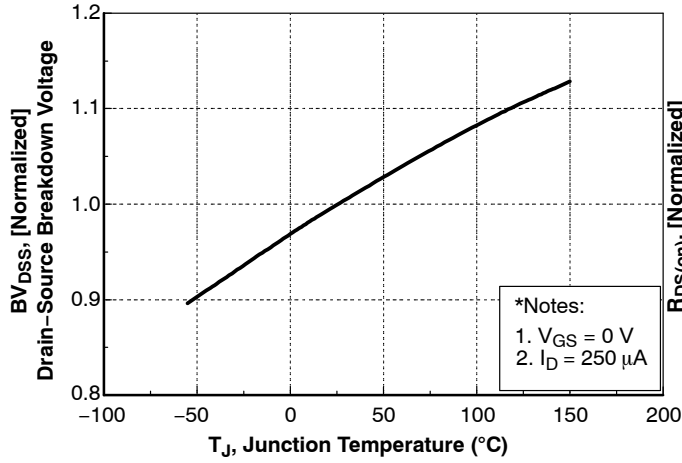


Figure 7. Breakdown Voltage Variation vs Temperature

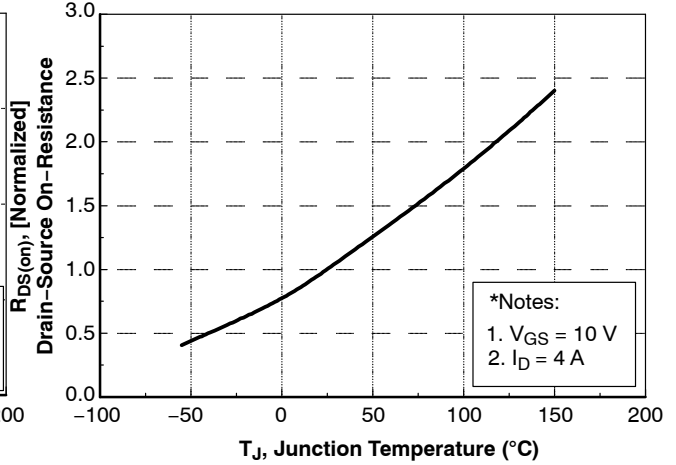


Figure 8. On-Resistance Variation vs Temperature

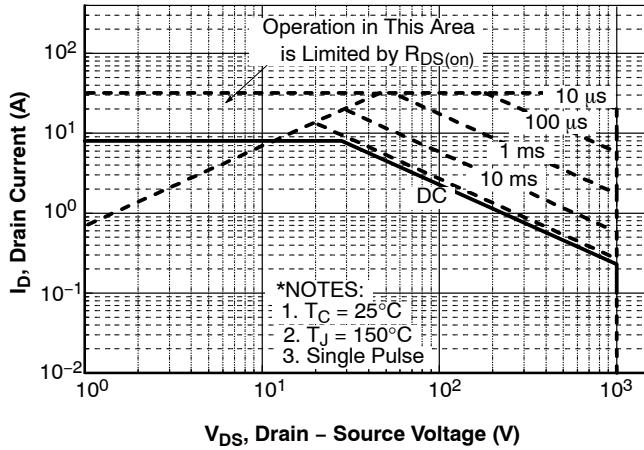


Figure 9. Maximum Safe Operating Area

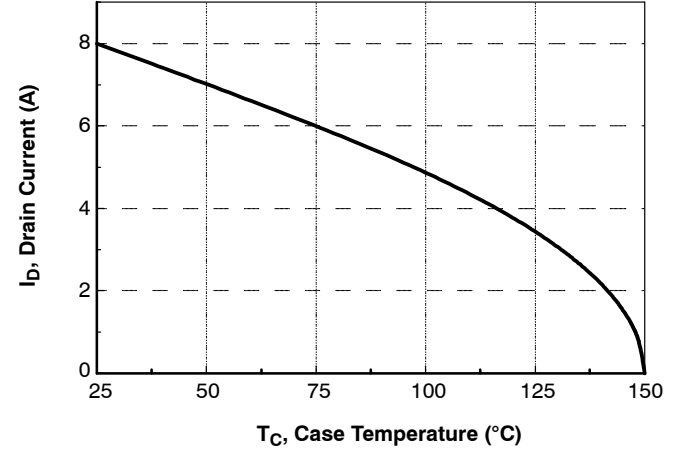


Figure 10. Maximum Drain Current vs. Case Temperature

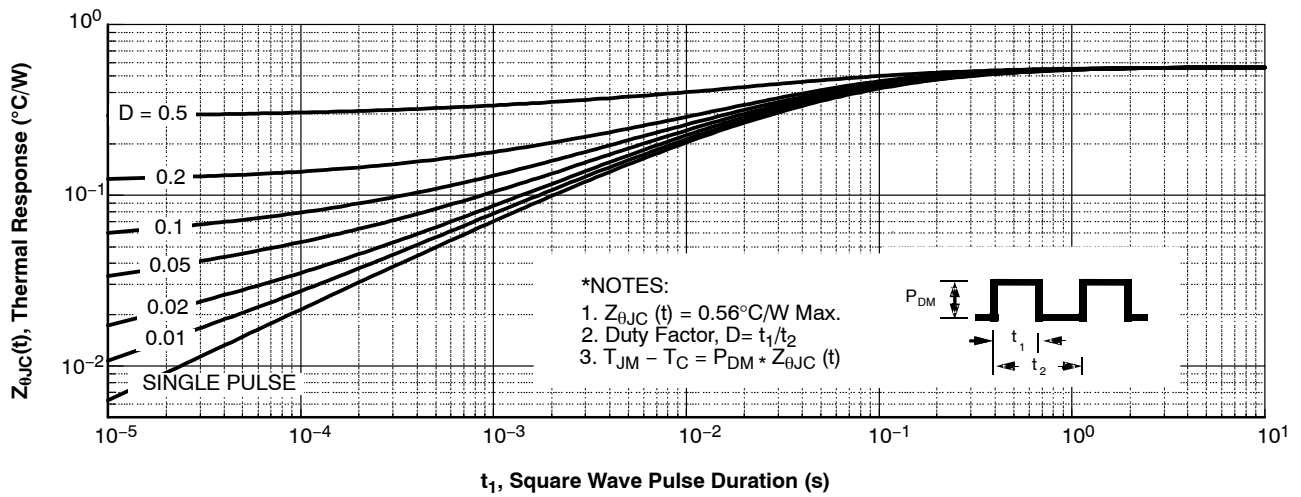


Figure 11. Transient Thermal Response Curve

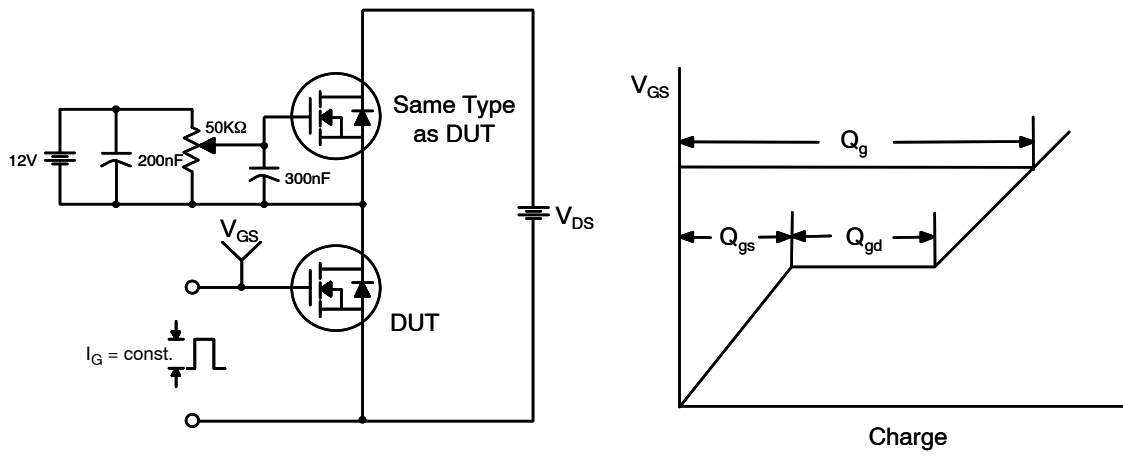


Figure 12. Gate Charge Test Circuit & Waveform

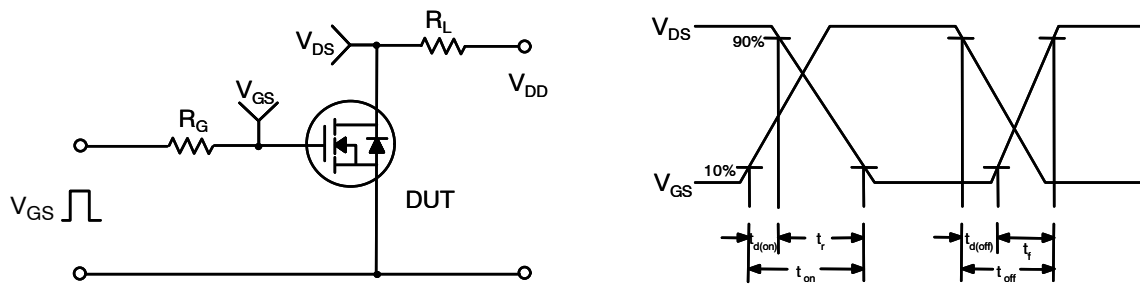


Figure 13. Resistive Switching Test Circuit & Waveforms

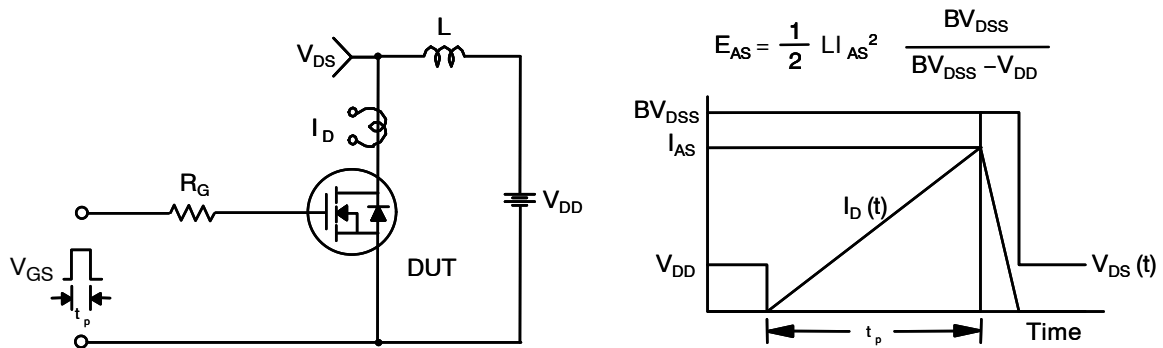
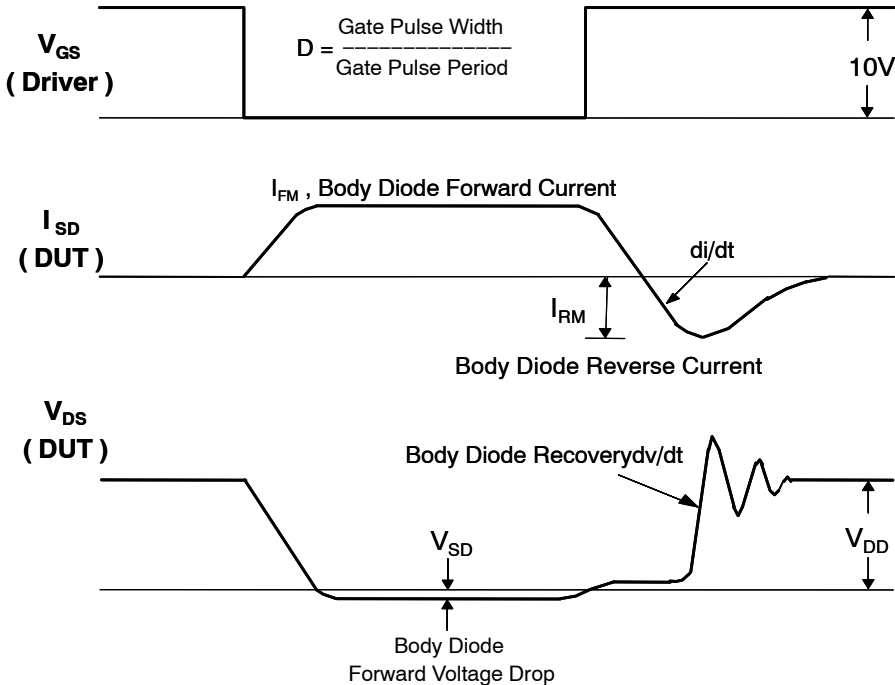
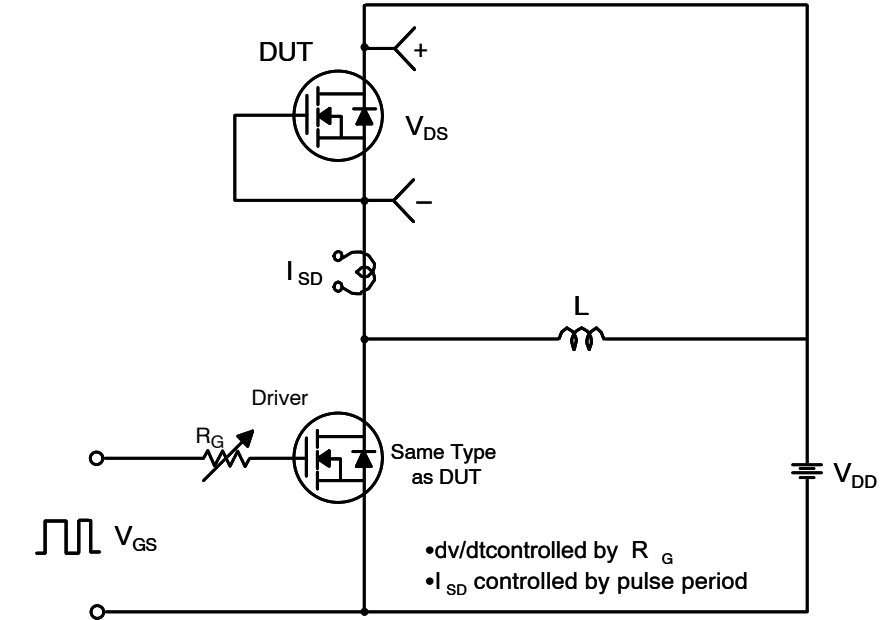


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

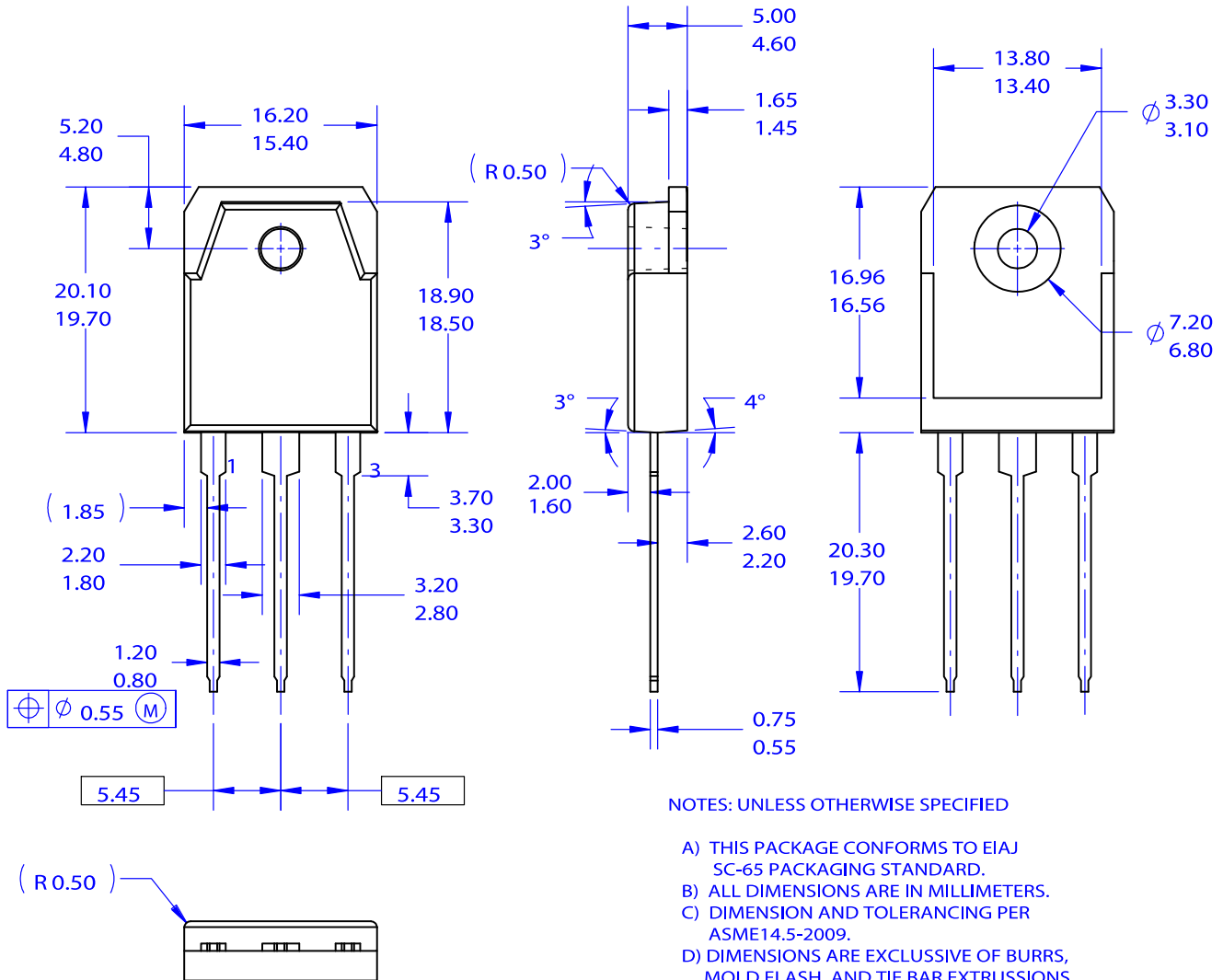
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### Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

TO-3P-3LD / EIAJ SC-65, ISOLATED  
CASE 340BZ  
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DATE 31 OCT 2016



NOTES: UNLESS OTHERWISE SPECIFIED

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- C) DIMENSION AND TOLERANCING PER ASME14.5-2009.
- D) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

|                  |                                  |                                                                                                                                                                                     |
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